POST-LAPITA HEALTH, LIFESTYLE, AND MORTUARY BEHAVIOR IN FIJI: A BRIEF REPORT

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ABSTRACT

This study analyzes skeletal remains from Fiji's relatively unexplored post-Lapita period (6th-19th centuries CE) to reconstruct lifestyle, health, and mortuary practice. Although the sample is small and highly fragmentary (over 1,000 fragments), the remains show limited evidence of osteoarthritis and peri- or post-mortem trauma. These remains may warrant further analysis in combination with addition skeletal materials to determine whether these cut marks are cannibalistic in nature. Preliminary examination of post-Lapita mortuary practice also suggests that burial position may have shifted from flexed to supine. While small fragmentary samples cannot provide demographic data (*i.e.*, individual ages and sexes) and therefore limit definitive conclusions, they can provide important insight into the lifestyle and behavior of ancient peoples.

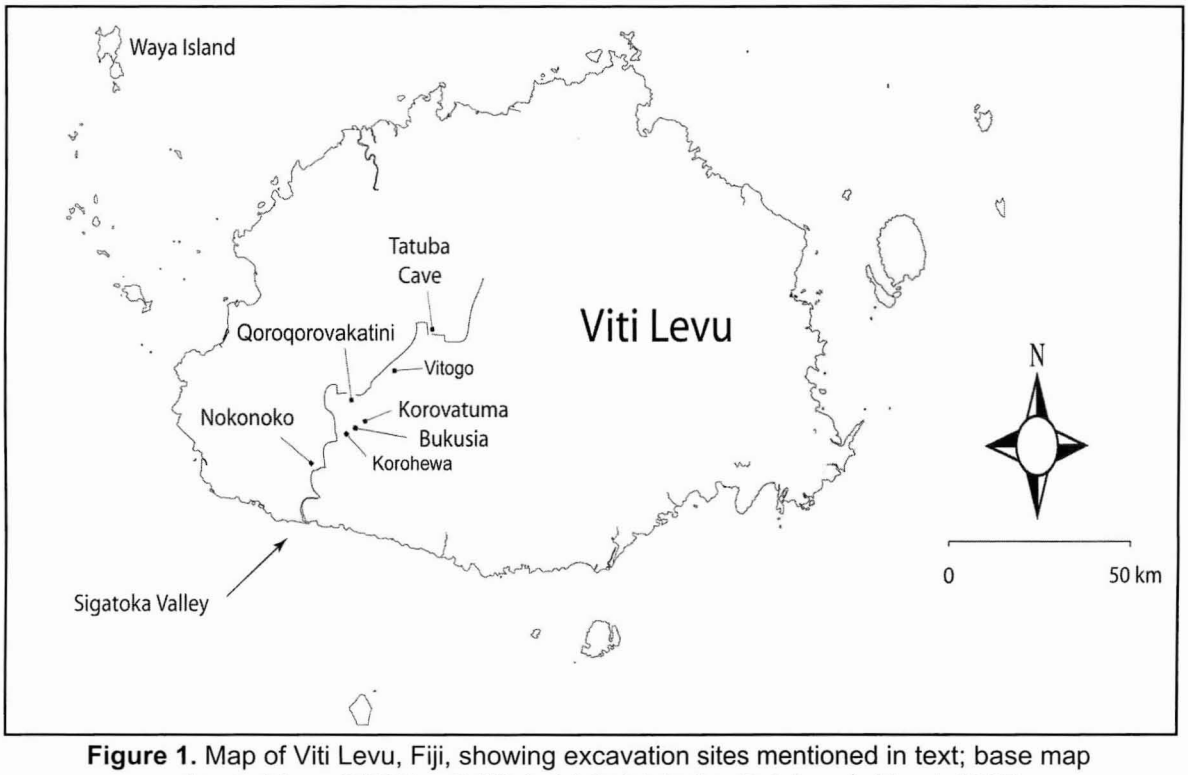

Figure 1. Map of Viti Levu, Fiji, showing excavation sites mentioned in text; base map extracted from GADM v. 8 (Global Administrative Database), March 2007.

INTRODUCTION

The examination of post-Lapita skeletal assemblages has the potential to expand the current data set on the study of Fijian prehistory, and also provide vital information relating to disease, diet, and mortuary practice. While many previous studies have focused on the Lapita people who were the first to colonize the Fijian Islands (900 BCE - 100 BCE), few have examined the period following. However, the examination of the Sigatoka Valley Sample, a post-Lapita population, will allow for a limited temporal comparison between the Lapita and post-Lapita groups. Previous research on Fijian skeletal series from the 11th - 19th centuries CE have indicated a wide range of mortuary practices, and also evidence for selective diets (Degusta 2000; Parke 1998; Pietrusewsky, *et al.* 2007; Pietrusewsky, *et al.* 1997; Valentin, *et al.* 2006) and to a lesser extent, disease (Pietrusewsky 1989a; Buckley, *et al.* 2008). In this report we will examine remains from primary and secondary burial contexts from the Sigatoka Valley, Fiji. Although this sample is limited in size, this report provides details of disease, diet, and mortuary practices from this region, and contributes to current understandings of Fijian prehistory.

While many archaeologists have examined the material culture and settlement patterns of the Fiji Islands (Anderson &

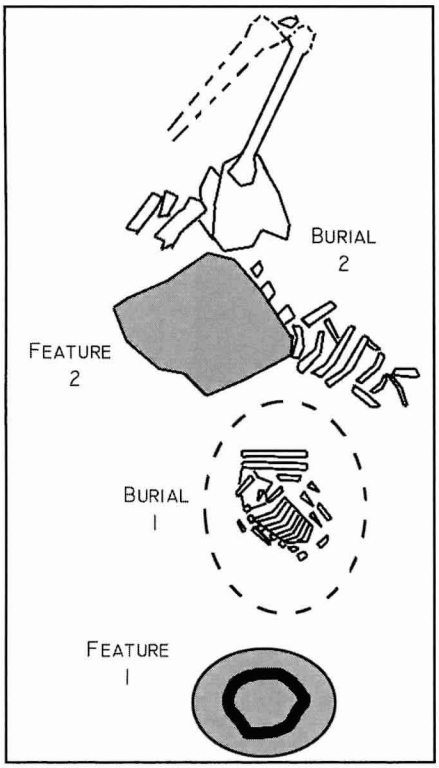

Figure 2. Sketch of *in situ* Burials 1 and 2, Nokonoko; reproduced from photographs and field sketches by J. Field.

Clark 1999; Best 1987; Burley 2005; Clark 1999, 2002; Cochrane & Neff 2006; Crosby & Marshall 1998; Dickinson, *et al.* 1998; Field 2005; Hunt 1981; Parry 1981, 1987, 1997; Rechtman 1992), there have been relatively few studies of human skeletal remains (Houghton 1989; Kirch, *et al.* 1989; Pietrusewsky 1989a, 1989b; Pietrusewsky, *et al.* 1998). Archaeological deposits along the coastline of the archipelago indicate that Fiji was colonized *c.* 3,000 BP, and its initial population was part of the expansion of "Lapita", a culture that has its origins in the islands of Southeast Asia and Melanesia (Allen & White 1989; Bellwood 1989; Kirch 1996). Skeletal remains from the Lapita period are rare, but a few individuals have been studied (Houghton 1989; Kirch, *et al.* 1989; Pietrusewsky 1989a, 1989b; Buckley, *et al.* 2008). Much of this work has focused on cranial variation, indicating that Lapita populations are morphologically similar to populations in East and Southeast Asia. Previous paleopathological studies indicated that strenuous physical activity and heavy mastication were present in these earliest populations (Marshall *et al.* 2000; Pietrusewsky, *et al.* 1997; Visser 1994).

The skeletal assemblage discussed in this paper was initially excavated as part of a larger archaeological examination of changes in settlement and fortification throughout the post-Lapita period (Field 2003, 2004). These skeletal remains were not excavated with the current bioarchaeological analysis in mind. As a result the sample is not of adequate size for a full bioarchaeological study and it cannot accommodate broad or definitive conclusions about the post-Lapita people. Rather, this report strives to discuss our limited findings and to stress the importance of future research in this area. We feel it is important to publish the result of analyses of small skeletal samples because, while alone they may not reveal much about past peoples, together groups of small skeletal assemblages may begin to reveal patterns in the health, lifestyle, and cultural practices of ancient peoples.

This study presents the analysis of approximately 150 identifiable fragments of skeletal remains from the Sigatoka Valley, Fiji. These remains were excavated from seven sites: Nokonoko, Bukusia, Tatuba Cave, Korovatuma, Qoroqorovakatini, Korohewa, and Vitogo (Figure 1). As indicated by AMS dating of cultural deposits and features, these remains date from the 6th to the 19th centuries CE (Field 2004), and thus represent a lengthy sequence of the post-Lapita period. During these centuries, Fijian populations established settlements throughout Fiji, and larger polities headed by chiefly families emerged within the broad deltas of windward Viti Levu (Routledge 1985; Rosenthal 1991; Crosby & Marshall 1998). The Sigatoka Valley was the site of centuries of competition and conflict during this period, as it is located in the arid, leeward side of Viti Levu, and its rich alluvial deposits were sought for cultivation. As a result, fortifications were constructed as early as the 6th century CE, and served as territorial strongholds for the local populations.

The remains reported here were retrieved from fortified habitation sites and examined for evidence of pathology, trauma, and mortuary practice. Many of these remains are fragmentary and were recovered from fill deposits, rubble walls, and house foundations (*yavu*). However, during the course of the 2001-2002 excavations, six burials were encountered and documented and two individuals were collected for further analysis. The analysis of both the burial and fragmentary remains suggests the presence of osteoarthritis (Bukusia, 15th and 19th centuries CE), dental caries (Bukusia, 15th and 19th centuries CE), and trauma (Nokonoko, 650-776 CE) in the skeletal series. These findings corroborate other studies from Fiji, and also indicate the trajectory of overall health improvement from the Lapita to the post-Lapita period.

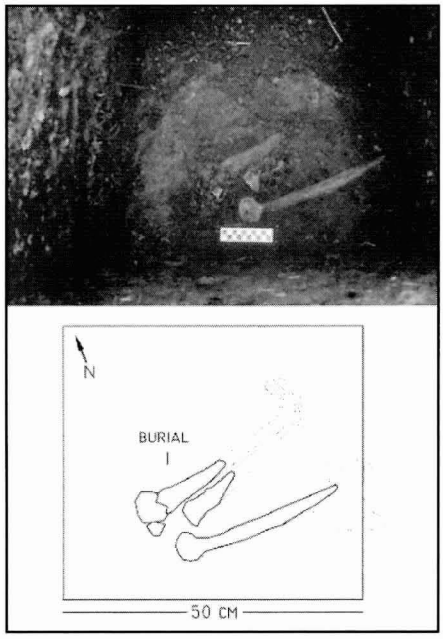

Figure 3. Photo and sketch of *in situ* Burial 3, Korovatuma; photographed and sketched by J. Field.

The Sigatoka Valley Sample

The Sigatoka Valley Sample consists of two types of skeletal remains: primary burials and secondary depositions recovered from fill material. Remains from secondary

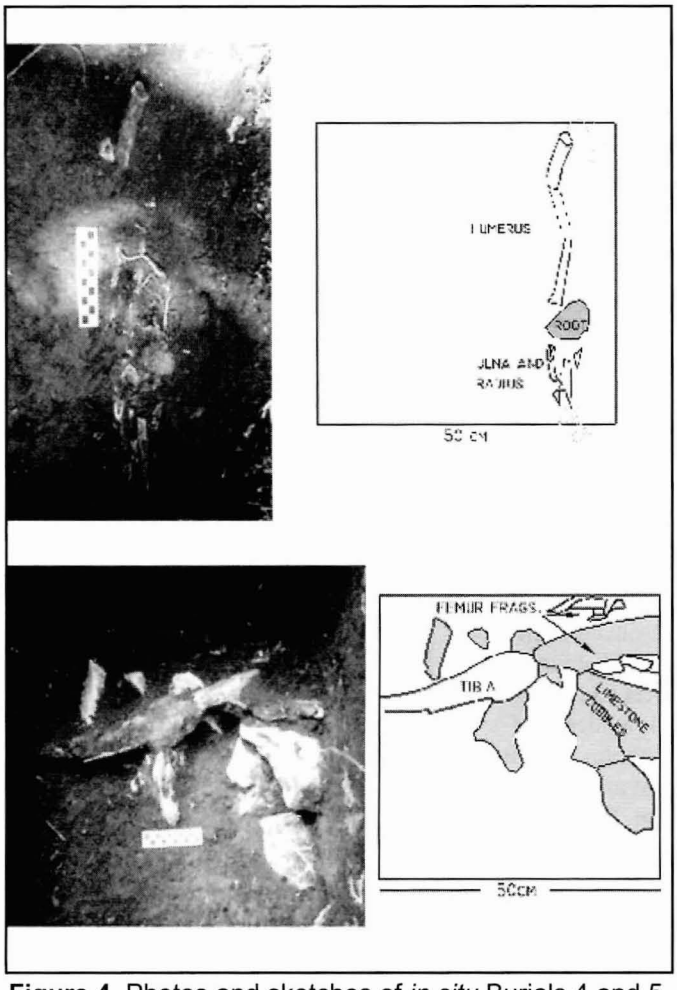

Figure 4. Photos and sketches of *in situ* Burials 4 and 5, Bukusia; photographed and sketched by J. Field.

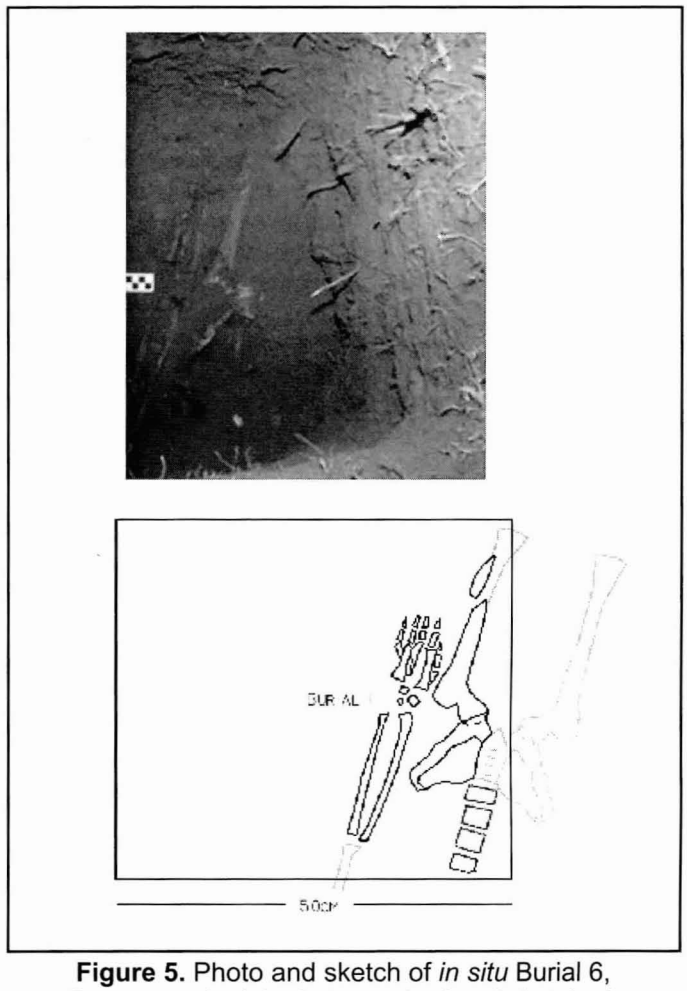

Figure 5. Photo and sketch of *in situ* Burial 6, Qoroqorovakatini; photographed and sketched by J. Field.

depositions were the most numerous; 5 of the 12 fortifications yielded remains of this nature, totaling nearly 1,000 fragments (Appendix 1). Due to the tropical climate of Fiji, these remains are poorly preserved and extremely incomplete. Fifteen percent of this assemblage was identifiable, providing limited information pertaining to age, sex, and pathological changes during the life of the individual. Fragmentary human remains are regularly recovered from Fijian sites, and their association with animal bone and midden refuse has often been suggested as evidence for prehistoric cannibalism (Best 1984; Gifford 1951; Rechtman 1992). Cannibalism is well described during contact-era Fiji, but archaeological evidence for the practice is controversial. The comparison of the Sigatoka Valley collection with other studies of cut-marks, burning, and trauma in Fijian skeletal material provides additional evidence for the complexity in identifying cannibalism (Degusta 1999, 2000; Pietrusewsky, *et al.* 2007). The age and extent of secondary deposits at each site could potentially provide additional insight into the frequency of this practice over time.

The burials from the Sigatoka Valley present a wide range of interment practices, from a group burial of flexed adults and children to single individuals in a supine extended position. The six excavated burials in the Sigatoka Valley Sample were mainly recovered from the foundations of house-platforms (*yavu*), although two were found at the base of a large burial mound (Table 1). Like the remains found in fill material, the six excavated burials in this sample were poorly preserved, though anatomical positioning indicates that they had experienced very little post-depositional alteration. When encountered during the excavations the oldest remains from Nokonoko (*cal.* 650-776 CE) were visibly degraded, suggesting a lengthy period of decay. Out of respect for the wishes of local Fijian descendents, only two of the six burials were removed for further analysis and are reported on in detail in this study. The remaining four burials were subject to a limited field inspection and were immediately re-interred. In total, the burials represented a minimum of six individuals, consisting of approximately five adults and one infant. However, the presence of a variety of fragmentary remains in the fill deposits surrounding these burials makes the determination of the exact number of individuals uncertain.

METHODS

Documentation in the Field

The excavation strategy in the Sigatoka Valley was designed to test for the presence of early cultural deposits in fortified settlement contexts, as well as to examine the age of constructed defensive features (Field 2003, 2004). To that end, the excavations were limited in size and focused on architectural elements, such as house foundations and walls. Burials were usually only partially exposed by an excavation, and, following their removal, the excavation usually continued into the deeper, earlier deposits. The presence of burials in the mounds, which served as house foundations (*yavu*), is relatively common, and likely reflects the re-use of the mounds by later generations long after the original house had been dismantled. The practice continues today in modern Fiji, as *yavu* are intimately connected with Fijian conceptions of ancestry and land tenure (Ravuvu 1983). Most burials were documented with photos and plan drawings in the field (Figures 2, 3, 4, & 5). The position and orientation of the burial was noted, and the age and sex of the individual was estimated. Collected remains were removed for analysis in the laboratory.

Laboratory Analyses: Health and Trauma

The collected skeletal remains were observed for evidence of pathological conditions including porotic hyperostosis, enamel hypoplasia, periostitis, and degenerative joint disease (osteoarthritis). These materials were also examined for evidence of treponematosis, leprosy, and tuberculosis (though these conditions are unlikely as they are more common with larger population aggregates than were present at this time [Larsen 1997]). The skeletal remains were also observed for indications of antemortem, perimortem, or postmortem trauma. All pathologies and traumatic injuries were recorded using the scoring method outlined in the Global History of Health data collection codebook (Steckel, *et al.* 2006). All remains were inspected visually with magnification and were recorded as individual fragments.

Table 1. Sigatoka Valley Burials.

site	*burial*	*depth below the surface*	*description*	*status*
Nokonoko	1	95 cm / 37 in.	child (<2 yrs.), flexed on right side, heat to south; 6 adult phalanges (lolokunemate tradition) present	analyzed in laboratory
Nokonoko	2	104 cm / 41 in.	adult, flexed on right side, head to south	analyzed in laboratory
Korovatuma	3	55 cm / 22 in.	adult, flexed on left side, head to south	recorded in field; re-interred
Bukusia	4	30 cm / 12 in.	adult, supine and extended, head to north	recorded in field; re-interred
Bukusia	5	55 cm / 22 in.	adult, supine and extended, head to northeast	recorded in field; re-interred
Qoroqorovakatini	6	65 cm / 26 in.	adult, supine and extended, head to south	recorded in field; re-interred

Note: AMS and standard radiocarbon dates originally reported in Field 2004. Calibrations shown here were performed with OxCal 4.0 (Bronk Ramsey 1995, 2001) using the atmospheric data from Reimer, *et al.* (2004).

The standard criteria of assessing cannibalism developed by Turner (1993) and White (1992), respectively, serves as the basis for much of the interpretation of Fijian skeletal remains (Degusta 2000:79, 1999). However, problems exist with using these criteria which were developed in a completely different cultural and climatic environment (*i.e.*, the American Southwest). For example, bone modifications which have been associated with cannibalism may have also resulted from local Fijian cultural practices including "interment beneath houses" (Pietrusewsky, *et al.* 2007:58; Degusta 2000).

While the criteria determined by Turner and Turner (1999) and White (1992) are an important outline of cannibalistic changes to the skeleton, many Fijian studies have adapted these standards and made them more applicable to fragmentary Fijian material (Spennemann 1987; Degusta 1999; Pietrusewsky, *et al.* 2007:66). For this reason, the current

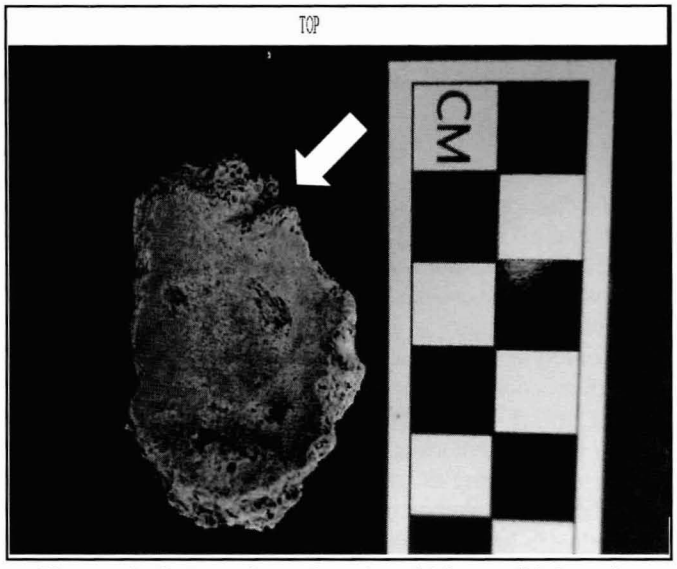

Figure 6. Cut mark on the glenoid fossa (Nokonoko Burial 2, 95-105 cm below surface); photographed by B. Kyle.

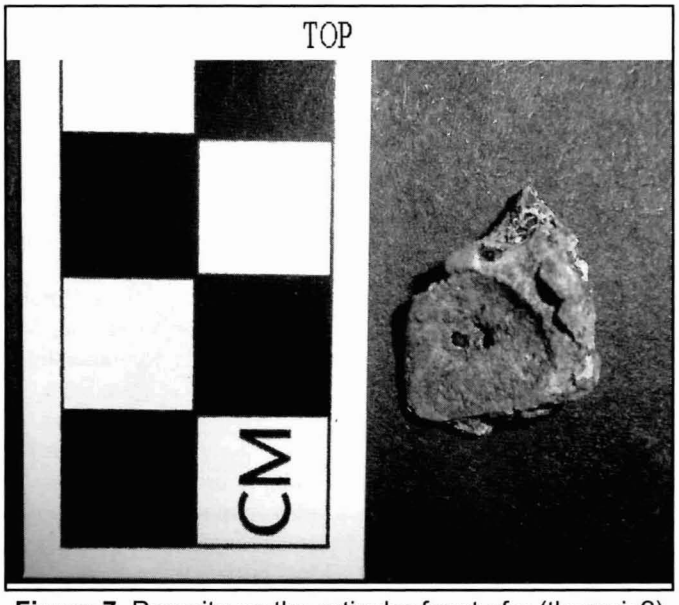

Figure 7. Porosity on the articular facet of a (thoracic?) vertebra (Bukusia TU 2, Lay II, Lev 10); photographed by B. Kyle.

study uses the standards developed to identify cannibalism in Fijian populations (Degusta 1999, 2000; Pietrusewsky, *et al.* 2007), while considering previous conventions (White 1992; Turner & Turner, 1999).

There is strong archaeological and ethnographic evidence for cannibalism in Fiji as early as 50 BCE (see Pietrusewsky, *et al.* 2007:56-58 for a comprehensive overview) and continuing after contact (Williams 1860). The collection under analysis provides skeletal material for the analysis of cannibalism in the relatively unexplored post-Lapita period.

Results

The Burials

Two human burials were excavated from the site of Nokonoko, within the Sigatoka Valley. Burials 1 and 2 were interred at the base of a 2-meter (6.5-foot) burial mound, which may have originally been a house platform. Burial 1 consisted of an infant, aged approximately one year, with the ribs, spinal column, and several long bones. The infant was buried in a flexed position, with the head oriented to the south and the legs drawn up to the chest (Figure 2). This individual represents the only case of indentified age found in this collection.

Burial 2 came from a similar context, as it lay at the base of Nokonoko's burial mound at a depth of 104 cm (41 in.). Upon excavation, it was noted that the individual had been placed in a flexed position with the head oriented to the south. The poor preservation of this skeleton did not allow for the estimation of age or sex. Analysis of the remains in the laboratory identified one post- or peri-mortem cut mark on the superior portion of the glenoid fossa of the scapula in this burial (Appendix 1; Figure 6). No other cut marks were found on the material from this individual. Dating of charcoal from a firepit associated with Burial 2 indicates that the remains likely date between 650-776 CE (at 2σ).

Burial 3 was uncovered at the site of Korovatuma. Only the femur, patella, tibia, and fibula were documented; the rest of the body lay beyond the limits of the test excavation (Figure 2). Burial 3 was an adult, and he or she had been placed in a flexed position on their left side, with the head oriented to the south (Figure 3). Cursory examination could not determine the sex or age of the individual. Following photography and sketching, the remains were left in place and the excavation terminated. Charcoal collected from the deposits surrounding the remains was dated to *cal.* 1455-1644 CE (at 2σ).

Burials 4 and 5 were encountered within a single test excavation at the site of Bukusia. Both individuals were documented *in situ* and then removed to continue the excavation (Figure 4). The remains were then returned to the excavation site and re-buried. Burial 4 was encountered at 30 cm (12 in.) below the surface, and consisted of metacarpals and fragments of a fractured ulna, radius, and humerus. As with Burial 3, only a portion of the body lay within the limits of the test excavation. However, the articulation of the bones indicated that the body had been in a supine position, with the head oriented to the north. The remains were likely those of an adult; however the sex was not determined. Burial 5 was directly below Burial 4, at a depth of 50 cm (20 in.) below the surface. The lower portion of this individual was uncovered (the left tibia, patella, femur, and portions of the os coxae) and their size was consistent with adult skeletal remains. The articulation of the remains indicated that the body was placed in a supine position with the head oriented to the northeast. Charcoal fragments from the sediments surrounding Burial 5 were submitted for radiocarbon dating. The resulting date

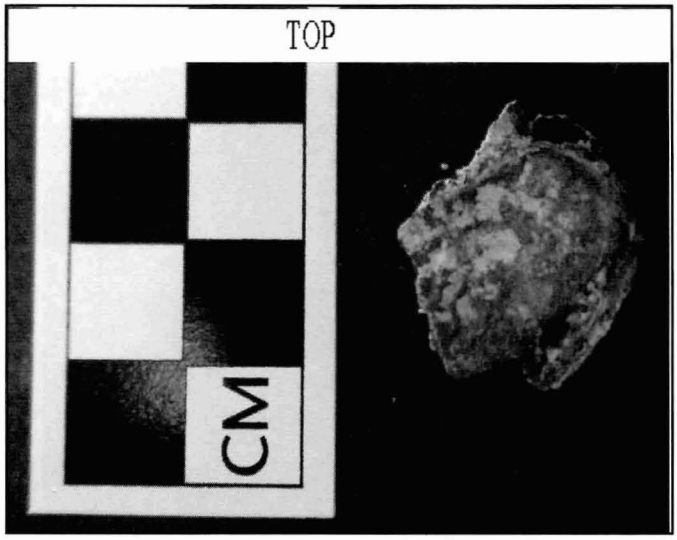

Figure 8. Marginal lipping on an articular facet of a lumbar vertebra (Bukusia TU2, Lay I, Lev ½); photographed by B. Kyle.

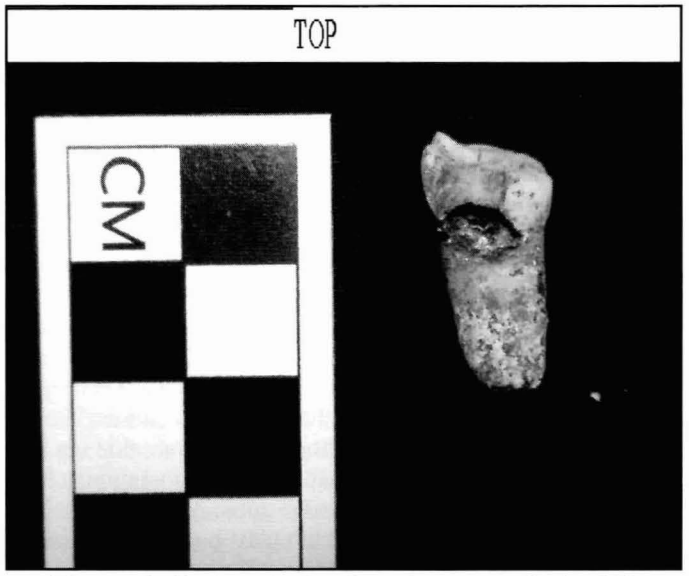

Figure 9. Carious lesion found on mandibular M2 (Bukusia TU2 85-94 cm below surface); photographed by B. Kyle.

indicates a calibrated age of 1492-1955 CE (at 2σ). Both Burial 4 and 5 likely date to 1492-1875 CE, because historic documents indicate that Bukusia was destroyed by Colonial forces in 1876.

Burial 6 was encountered in the excavation of a house mound at the site of Qoroqorovakatini. At 55 cm (22 in.) below the surface, the remains of an articulated adult were discovered, consisting of an individual in the supine position, with the head oriented to the south (Figure 5). The excavation revealed the bones of the left upper limb, several vertebral fragments, portions of the os coxae, and a proximal femur. The remaining portions of the skeleton lay beyond the boundaries of the excavation. The burial was uncovered for sketching and photography, and was removed in order to continue excavating in the sediments below the remains. Charcoal retrieved from the base of the excavation provides a calibrated radiocarbon age of 1449-1954 CE (at 2σ). Like Korovatuma, Qoroqoro-vakatini was destroyed by Colonial forces in 1875. Therefore the bounding date for the age of Burial 6 is 1449-1875 CE. All the bones and fragments were reburied in the bottom of the excavation at the site.

The Secondary Depositions

Fragmentary human remains were encountered in the fill deposits of walls, house foundations, and middens. Out of a sample of approximately 150 identifiable human fragments in the entire skeletal assemblage, 63% of these fragments come from secondary deposits. Of these secondary deposits the bulk of the material was excavated from the sites of Nokonoko and Bukusia. While the Nokonoko and Bukusia test units were primarily composed of human bone, many of the other sites had much more animal bone mixed in with the human bone. These fill deposit materials are made up of approximately 25% human cranial and 75% human postcranial material.

Of the approximately 150 skeletal fragments within this skeletal assemblage, approximately 18 observable joint surfaces were present. Of these 18 joint surfaces, 2 cases of osteoarthritis were identified, evidenced by porosity and marginal lipping 911% of observable joint serfaces). Both occurred on articular facets of vertebral elements; one of which was on a lumbar vertebra (Figures 7 & 8). These remains were recovered from the site of Bukusia, which was a large fortified complex with a limestone cavern system at its core, dating between the 15th and 19th centuries CE. Both vertebrae were recovered from Test Unit 2, which bisected a defensive rubble wall (one near the surface at Lev. 1-2 and the other at a depth of 44-54 cm [17-22 in.] below the surface). There were many fragments of human skeletons in the wall fill, which suggests that the fill material was obtained from a cemetery area. These instances of osteoarthritis may suggest mechanical loading, old age, or a variety of other etiologies (Jurmain 1977; Ruff, *et al.* 1994; Larsen 1997; Weiss 2006; Lieverse, *et al.* 2007). Porotic hyperostosis and periostitis were not observed in this skeletal series.

Seventeen teeth were recovered from the Sigatoka Valley sample. Of these, 3 had evidence of carious lesions (Figures 9 and 10). All the affected teeth came from Test Unit 2 at the site of Bukusia, and 2 were from the same individual. In TU2 at 85-94 cm (34-37 in.) below the surface, a right mandibular molar was found with a very advanced root lesion. In TU2 at 50-60 cm (20-24 in.) below the surface there is a right mandi-bular fragment with an interproximal carious lesion spanning M2 and M3. No enamel hypoplasias were observed on any of the dentition in this collection.

Evidence for trauma in the secondary deposits is limited to a single fragment from Nokonoko. One fragment of a long bone (potentially a femur) was recovered from the fill of the

burial mound, at a depth of 55 cm (22 in.) below the surface. Two cut marks were visible on the broken surface of the bone, located horizontally on the exposed surface spanning from the periosteum to the endosteum. These cut marks occurred in proximity to one another, suggesting repetitive, forceful blows, possibly caused by chopping (Figure 11). There is no evidence that healing of the bone occurred, which implies that these cut marks occurred post- or peri-mortem.

Discussion

The Burials

The earlier burials (Burials 1-3) were all found in flexed position, while the later burials (Burials 4-6) were laid out in supine position. This suggests that burial positioning may have changed through time (from flexed to supine) in the post-Lapita period. This general trend in burial positioning from flexed to supine is also observed by others in different settings (for a review of mortuary practice in Fiji, see Pietrusewsky, *et al.* 2007:55). However, it is important to remember that the small sample size and the fact that these burials come from diverse sites with potentially dissimilar burial practices cannot provide authoritative evidence of this temporal change. The cut mark observed on the glenoid fossa of the scapula in Burial 2 will be discussed below with the cut marks found in the secondary deposits.

The Secondary Deposits

The analysis of the post-Lapita skeletal material shows little evidence of pathology during this period. While this analysis is limited by a small sample of fragmentary remains, analysis of the dentition and other material suggests that the post-Lapita Fijians may have been fairly healthy with little nutritional deprivation, disease, or infection. While they did consume some cariogenic foods — hence the evidence of carious lesions — there is no evidence of enamel hypoplasia, porotic hyperostosis, or periostitis in this collection. Early missionaries, like Williams (1860), noted that "food of every kind abounds, and, with a little effort, might be vastly increased. The land gives large supply spontaneously, and, undoubtedly, is capable of supporting a hundred times the number of its present inhabitance". The low prevalence of pathological changes observed in this collection may be the result of this abundance of sustenance combined with low population pressure. However, a larger sample is needed to confirm these very preliminary results, as the absence of evidence of pathology does not constitute evidence of the absence of disease and nutritional deprivation.

Nearly 18% (3/17) of the teeth observed in the Sigatoka Valley Sample had dental caries — although again it is important to note the very small sample size and the fact that most of these teeth came from the site of Bukusia (n=10). This percentage is far less than the 38.3% of teeth with caries which was observed in the Lapita period by Buckley, *et al.* (2008:96), the 50% 50% (2/4) observed by Pietrusewsky, *et al.*

Figure 10. Caries found between M2 and M3 (Bukusia TU2, Lay II, Lev 6); photographed by B. Kyle.

(1997:368), or the 60% (3/5) observed by Pietrusewsky (1989b:305). These samples are small and therefore inconclusive, but this pattern may suggest a temporal improvement in dental hygiene or an increase in high-quality foods (*i.e.*, animal sources of protein; Larsen 1997). However, other Lapita samples have reported caries rates between 4% and 16% (2/12) (Kirch, *et al.* 1989; Pietrusewsky, *et al.* 1998; Buckley, *et al.* 2008). Most of the teeth in our collection were excavated from the site of Bukusia (n=10). Additionally, all the teeth with caries came from Bukusia. Therefore, 30% of the teeth in the Bukusia sample had dental caries. Although this sample is not representative of the skeletal series as a whole, it suggests that individuals at Bukusia consumed foods which were cariogenic, such as carbohydrate-rich taro and yam. The lack of caries and hypoplasias in the rest of the population may be a result of sampling issues, or it may suggest that the Sigatoka Valley population as a whole did not experience significant rates of infection, disease, or nutritional deprivation during growth. This skeletal assemblage combined with other small skeletal series may shed light on the question of dental health during the post-Lapita period.

The two cases of osteoarthritis (11%) observed in this collection tell us little about past behavior due to a lack of demographic data. While these cases may have resulted from

wear and tear on the joint surfaces due to strenuous physical activity as is observed in other Fijian collections (Marshall, *et al.* 2000; Pietrusewsky, *et al.* 1997; Visser 1994), they may as easily be the result of advanced age. With little demographic data in this collection and few preserved joint surfaces, the analysis of osteoarthritis cannot provide any specific conclusions. Buckley, *et al.* (2008:96) reported osteoarthritis in 25% of Lapita individuals, while Pietrusewsky, *et al.* (1997) and Pietrusewsky, *et al.* (1998) reported very low rates of osteoarthritis; however, these data are not directly comparable to the data in this sample as the number of individuals observed is indeterminate.

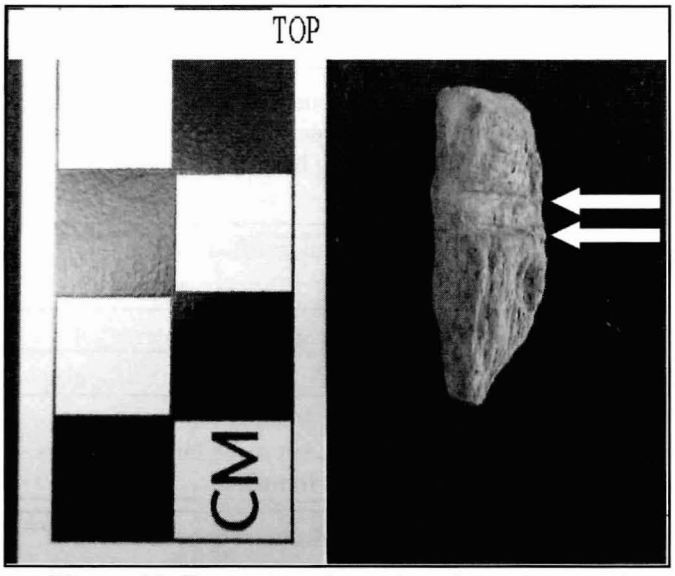

Figure 11. Two cut marks on long bone fragment (Nokonoko TU1, Lay I, Lev 4, 44-54 cm below surface); photographed by B. Kyle.

Since the few studies conducted on Fijian skeletal material have focused on cannibalism (Degusta 1999, 2000) and reports of cannibalism are common in the Fijian ethnographic record, it is tempting to suggest that the cut marks observed in this collection are the result of cannibalism. However, these three postmortem or perimortem cut marks found on two bone fragments (of approximately 150 identifiable skeletal fragments) alone cannot be definitively indicative of cannibalism. We are unable to associate these cut marks with animal bone processing (Degusta 2000) and no human bones in this collection indicate exposure to fire or peeling. Other non-cannibalistic explanations for postmortem cut marks on human bone include excavation damage, perimortem injury, damage during secondary burial, and ritual practice which do not include the consumption of human flesh (Hurlbut 2000; Pietrusewsky, *et al.* 2007).

Data from other analyses of Fijian cannibalism show far more evidence of modifications to human bones. These include exposure to heat or fire, percussion pits, and butchery cut marks (Spennemann 1987; Degusta 1999, 2000; Pietrusewsky, *et al.* 2007). For example, Pietrusewsky, *et al.* (2007:61) observed 172 identifiable fragments from an adolescent earth-oven burial. Of these remains, 11 showed some type of cannibalistic modification. Five of these remains showed evidence of exposure to heat or fire, 6 showed potential or obvious cut marks, and 1 had a percussion pit. Additionally, those bones with cut marks typically showed multiple cut marks (with a maximum of 8). Even with this more extensive evidence of cannibalism, Pietrusewsky, *et al.* (2007) do not definitively conclude that these modifications were the result of the consumption of human flesh. There were no secure indications of cannibalism in this post-Lapita material.

Conclusion

Analysis of mortuary practice in this collection suggests that burial positioning may have changed from flexed to supine during the post-Lapita period. There was very little pathology observed in this post-Lapita Fijian skeletal series. Although further examination is required to determine true health status, this implies that these people may have experienced little nutritional deprivation, disease, infection, or rigorous physical activity. Similarly, while there is evidence of peri- or post-mortem cut marks in this population, more evidence is needed in order to consider cannibalism as an explanation.

While the fragmentary nature of this collection severely limits skeletal analysis, poor preservation is a fact in many skeletal collections found on tropical islands and we cannot simply ignore these remains. Although this analysis did not reveal definitive evidence of past health or cultural practice, it highlights the importance of further research in this region. There are very few previous studies which provide direct skeletal evidence of ancient human behavior in Fiji. This analysis, and other pilot studies, demonstrates that evidence of pathology, trauma, and complex mortuary practice do exist even in fragmentary material. With a larger skeletal sample it may be possible to say something meaningful about the lives of prehistoric Fijians despite the poor preservation of Fijian skeletal material.

Appendix 1. Sigatoka Valley Collection Inventory

site	*test unit*	*layer / level*	*depth below the surface*	*laboratory identification*
Nokonoko	1	Burial 1	84-95 cm / 33-37 in.	fragmented remains of 1 human subadult buried with adult human phalanges; animal bone also present; 6 adult distal hand phalanges; 2 distal foot phalanges (subadult, shows partial epiphyseal closure); 16 epiphyseal caps with much billowing; 1 triquelateral fragment; 21 neural arch fragments; 1 subadult, cranial fragment; 37 animal rib fragments; 1 animal skull fragment; 15 animal long bone fragments; 107 unidentified fragments
Nokonoko	1	Burial 2	95-105 cm / 37-41 in.	1 calcaneus (adult of unknown sex); 2 os coxae fragments (one from near greater sciatic notch; sex unknown, adult); 4 rib fragments (adult, sex unknown); 1 vertebral centrum cap; 1 vertebral facet (probably interior); 1 glenoid cavity scapula fragment with cut mark; 4 charred miscellaneous (mostly long bone shafts crushed/cracked); 7 animal remain fragments (ribs and long bone shafts); 112 unidentified fragments
Nokonoko	1	Lay I / Lev 1	0-20 cm / 0-8 in.	2 cranial fragments; 1 rib fragment; 35 unidentified fragments
Nokonoko	1	Lay I / Lev 2	20-33 cm / 8-13 in.	3 cranial fragments; 12 animal long bone fragments (charred); 4 unidentified fragments
Nokonoko	1	Lay I / Lev 3	33-44 cm / 13-17 in.	1 proximal phalanx; 2 cranial fragments; 3 animal rib fragments (charred); 3 animal long bone fragments; left mandibular desiduous M2 with crown complete and initial root formation
Nokonoko	1	Lay I / Lev 4	44-54 cm / 17-21 in.	1 long bone fragment with two chop marks (next to each other); 1 cranial fragment (parital or frontal); 7 charred animal fragments; 6 unidentified fragments
Nokonoko	1	Lay I / Lev 5	54-62 cm / 21-24 in.	3 cranial fragments; 5 animal fragments (long bones, charred); 2 pig teeth; 8 unidentified fragments; human right mandibular M1 with Carabelli's groove on buccal surface, right maxillary P_4 with 3/4 dentin exposure, right desidous maxillary i2 with initial dentin exposure and 1/3 root resorption) — no caries or hypoplasias
Nokonoko	1	Lay I / Lev 6	62-74 cm / 24-29 in.	4 cranial fragments; 3 animal long bone fragments; 4 animal rib fragments; 14 charred animal fragments (ribs, long bones); 7 unidentified fragments; right mandibular M1 with heavy polish and interproximal wear, left maxillary desiduous M1 with 2/3 root resportion, and 2 tooth fragments (teeth are obviously not from the same individual) — no caries or hypoplasias
Nokonoko	1	Lay I / Lev 7	74-84 cm / 29-33 in.	2 human long bone fragments (1 femoral, 1 ulna proximal midshaft-no olecronon or coronoid process); 1 temporal fragment; L navicular fragment; 1 subadult mandibular fragment with articular eminence and mandibular fossa; 7 charred animal fragments (long bone shaft fragments with extensive cracking); 24 unidentified fragments;1 tooth fragment
Bukusia	2	Lay I / Lev 3	20-30 cm / 8-12 in.	4th distal hand phalanx

site	*test unit*	*layer / level*	*depth below the surface*	*laboratory identification*
Bukusia	2	Lay I / Lev 4	30-40 cm / 12-16 in.	1 rib fragments (vertebral end); 2 cranial fragments; unidentified fragments
Bukusia	2	Lay I / Lev 5	40-50 cm / 16-20 in.	2 human orbital fragments; 1 occipital condyle (with taphonomic porosity); 3 cranial fragments; 1 mandibular fragment; animal teeth; unidentified fragments; maxillary right P_3 (no caries or hypoplasias)
Bukusia	2	Lay I / Lev 7	60-70 cm / 20-28 in.	2 long bone fragments; 1 distal end of proximal hand phalanx (3rd?); 1 hand or foot phalanx fragment; unidentified fragments
Bukusia	2	Lay I / Lev 1-2		2 long bone fragments; 1 vertebral articular facet (lumbar? Mild osteoarthritis)
Bukusia	2	Lay II / Lev 4	80-90 cm / 32-35 in.	adult left scaphoid; adult cranial fragments; adult long bone fragments; subadult mandibular fragment with both desiduous canines errupting, maxillary right desiduous canine (root broken), mandibular left di1 (root complete), no caries or hypoplasias (dental age=2 yrs. ± 8 mos.; Buikstra & Ubelaker 1994)
Bukusia	2		85-94 cm / 33-37 in.	right mandibular M2 with large carious lesion and dentin exposure on all cusps, right mandibular P4 with dentin exposure on both cusps
Bukusia	2	Lay II / Lev 6	50-60 cm / 20-24 in.	1 mandible fragment (with left M1, M2, M3, significant dentin exposure on M1 and M2; heavy polish on M3; caries on M2 and M3); 2 phalanges fragments; 1 fibular midshaft fragments; unidentified fragments
Bukusia	2	Lay II / Lev 8	70-80 cm / 28-32 in.	lumbar and thoracic vertebral fragments and cranial fragments
Bukusia	2	Lay II / Lev 10	90-100 cm / 35-39 in.	1 left tibial fragments (distal end with medial maleolus); 1 scapular fragments; 1 fibular fragment; 2 rib fragments (both with tubercle); cranial fragments; 1 thoracic vertebrae fragments (with evidence of mild osteoarthritis on the costal factet-rib articulation); 1 left distal 1st foot phalanx; unidentified fragments
Bukusia	2	Lay II / Lev 11	100-110 cm / 39-43 in.	1 os coxae fragment (illium); 2 long bone fragments
Tatuba Cave	1	Lay I / Lev 1	0-10 cm / 0-4 in.	1 right rib fragment (approximately 1/2 with sternal end preserved, left occipital condyle; 1 rodent mandible
Koroivatuma	1	Lay I / Lev 1	0-10 cm / 0-4 in.	1 vertebral superior articular facet (lumbar or T12)
Koroivatuma	1	Lay I / Lev 3	20-30 cm / 8-12 in.	1 cervical vertebrae transverse process
Koroivatuma	2	Lay I / Lev 5	40-50 cm / 16-20 in.	unidentified fragments
Koroivatuma	2	Lay I / Lev 6	60 cm / 24 in.	unidentified fragments

site	*test unit*	*layer / level*	*depth below the surface*	*laboratory identification*
Koroivatuma	Core C1		0-46 cm / 0-18 in.	4 thoracic? vertebral articular facets
Qoroqorovakatini	1	Lay I / Lev 1	0-10 cm / 0-4 in.	1 metacarpal (3rd?)
Korohewa	2	Lay I / Lev 1	0-10 cm / 0-4 in.	2 long bone fragments; unidentified fragments
Vitogo	1	Lay I / Lev 6	50-60 cm 20-24 in.	1 metatarsal (3rd or 4th)

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